

HOMER: The Micropower Optimization Model

1. What is HOMER?

A tool for comparing and evaluating micropower technology options for a wide range of applications

- Village power systems
- Stand-alone applications
- Grid-connected applications
- Conventional technologies
- New technologies

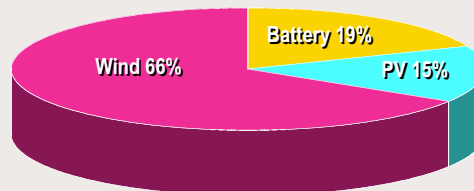


2. What does HOMER do?

- HOMER finds the combination of components that can serve a load at the lowest life-cycle cost
- HOMER inputs describe

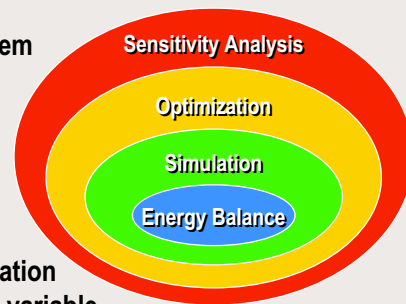
- Component costs and performance characteristics
- Resource availability
- Loads

Total Annualized:
\$220/yr



3. Inside HOMER

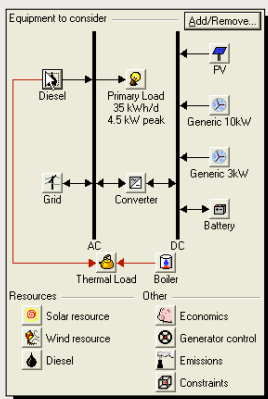
- Simulation
 - Estimate the cost and determine the feasibility of a system design over the 8760 hours in a year
- Optimization
 - Simulate each system configuration and display list of systems sorted by net present cost (NPC)
- Sensitivity Analysis
 - Perform an optimization for each sensitivity variable



4. Technologies HOMER Can Model

Any combination of:

- Photovoltaic
- Wind turbine
- Run-of-river hydro
- Genset
 - Reciprocating
 - Micro-turbine
 - Fuel cell
 - Biomass
 - Cogeneration
- Battery bank or hydrogen storage system
- Grid-connected or stand-alone



5. HOMER Is Flexible

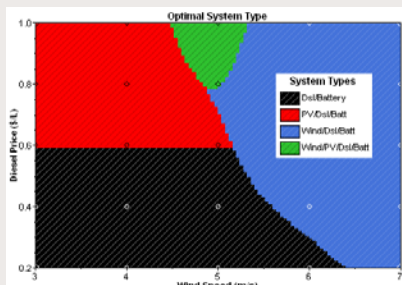
- You can model systems using only basic inputs
 - Annual averages for resources and loads
 - Cost per kW or unit for equipment
- Or with more detailed information
 - Measured hourly data
 - Detailed cost curves
 - Create your own wind turbine, battery, and fuels

6. Questions HOMER Can Answer

- Should I buy a wind turbine, PV array, or both?
- Will my design meet growing demand?
- How big should my battery bank be?
- What if the fuel price changes?
- How should I operate my system?
- And many others...

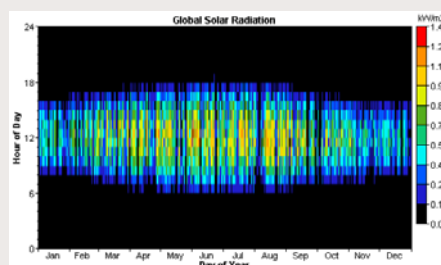
7. What system type is most cost effective in which application?

- Shows the minimum wind speed for wind to be cost-effective
- Shows the minimum fuel price for PV
- Shows when hybrids are better
- Easily evaluate the sensitivity of results to changing assumptions



8. Solar Analyses

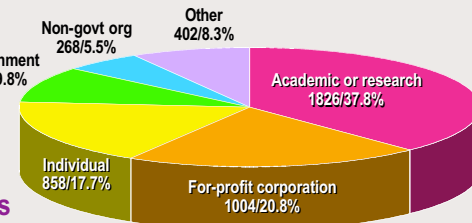
- Tilt, azimuth, tracking effects
- Backup requirements
- Economic impacts of time-of-day rates
- Emission offsets



9. Who Uses HOMER?

- System designer: evaluate technology options
- Project manager: evaluate costs of different options
- Program manager: explore factors that affect system design (resource availability, fuel price, load size, carbon emissions, etc.)
- Educator: teach and learn about renewable energy technologies
- >5000 Users
- 162 countries

Organization
Types of
HOMER Users



10. HOMER 2.1 New Features

- Multiple grid rates
- Better emissions modeling
- Generator scheduling
- Automatic solar resource data retrieval
- Improved interface
 - Simpler generator fuel curve
 - Simpler wind resource
 - Easier specification of search space
 - Better reporting in HTML and XML
- Faster processing

11. User Testimonials

- “HOMER is an indispensable tool when we talk of electrification with renewables”
Cecilio U. Sumaoy, Cagayan Electric Power and Light Co., Philippines
- “I have found that [HOMER] is being accepted within certain circles of industry and could potentially become a widely adopted industry standard for presenting economic and technology evaluations”
Brook Porter, Intelligent Energy, Ltd., USA

12. Downloading HOMER

- <http://www.nrel.gov/homer>
- Complete registration survey
 - HOMER development team uses survey to make improvements to software
- Renew after 180 days by completing renewal form
- Send email to renew if Web access is difficult

Contact

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